

The Bioinformatics Lab

Challenge

—

Network Filesystems and Grid Computing

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Overview

- Network File System (NFS)
- Samba Server
- SSH File System
- Sun Grid Engine

NFS

- Install required packages:

```
# apt-get install nfs-kernel-server nfs-common
```

- Laszlo's Tip:

Use a bind mount to make /home available in /srv/nfs4/home

```
$ mount --bind /home /srv/nfs4/home
```

- Edit /etc/exports

```
/to/be/exported destination(option1,option2=0)
```

/etc/exports

```
>
># export to world
>/srv/nfs4/home *(ro,root_squash,all_squash,no_subtree_check)
>
># export to L1
>/srv/nfs4/home daniel.tbl(rw,no_root_squash)
>
># export to L2
>/srv/nfs4/home 192.168.16.39(rw,no_root_squash)
>
># export to localhost
>/srv/nfs4/home 127.0.0.1(rw,no_root_squash)
>
```

/etc/exports

- root_squash

Map requests from uid/gid 0 to the anonymous uid/gid. Note that this does not apply to any other uids or gids that might be equally sensitive, such as user bin or group staff.

- all_squash

Map all uids and gids to the anonymous user. Useful for NFS-exported public FTP directories, news spool directories, etc. The opposite option is no_all_squash, which is the default setting.

exportfs

- Restart nfs-common server
`/etc/init.d/nfs-common restart`
- exportfs
 - used to maintain the current table of exported file systems for NFS
 - list kept in `/var/lib/nfs/etab`
 - etab read by mountd,
when access request by remote host to mount a file tree

Export & Mount

- load entries made in /etc/exports:

```
# exportfs -vra
exporting daniel.tbl:/srv/nfs4/home
exporting localhost:/srv/nfs4/home
exporting 192.168.16.39:/srv/nfs4/home
exporting */:/srv/nfs4/home
```

- mount from export:

```
# mkdir /mnt/daniel-home
# mount -t nfs daniel.tbl:/srv/nfs4/home
/mnt/daniel-home
```

Export & Mount (nfs4)

- Change /etc/exports

```
># export to world  
>/srv/nfs4/home  
  *(ro,root_squash,all_squash,no_subtree_check,fsid=0)  
>
```

- Mount as nfs4

```
# mount -t nfs4 daniel.tbl:/ /mnt/daniel-home
```

- Why? → man export

For NFSv4, there is a distinguished filesystem which is the root of all exported filesystem. This is specified with `fsid=root` or `fsid=0` both of which mean exactly the same thing.

Entry in /etc/fstab

- Syntax fstab entries:
`fs_spec fs_file fs_vfstype fs_mntops fs_freq fs_passno`
- What they mean:
`to_be_mounted /mnt/point ntfs options do_dump? when_fsck?`
- Example
`UUID=abc /mnt/heaven ext4 rw 0 2`
- Our case:

```
># nfs4
>daniel.tbl:/ /mnt/daniel-home nfs4 noauto,ro 0 0
># nfs
>daniel.tbl:/srv/nfs4/home /mnt/daniel-home nfs
noauto,ro 0 0
>
```

Samba Server

Setup Samba

- Install packages

```
# apt-get install samba smbclient samba-doc
```

- Set samba password

```
# smbpasswd -a daniel
```

Create share “clipboard”

- Edit /etc/samba/smb.conf

```
[clipboard]
  comment = daniel's clipboard
  path = /srv/samba/clipboard
  writeable = yes
  browseable = yes
  read only = no
  security = user
  valid user = daniel
  force create mode = 0777
  force directory mode = 0777
```

View available shares

- `$ smbclient -L daniel.tbl -U daniel`

- Output

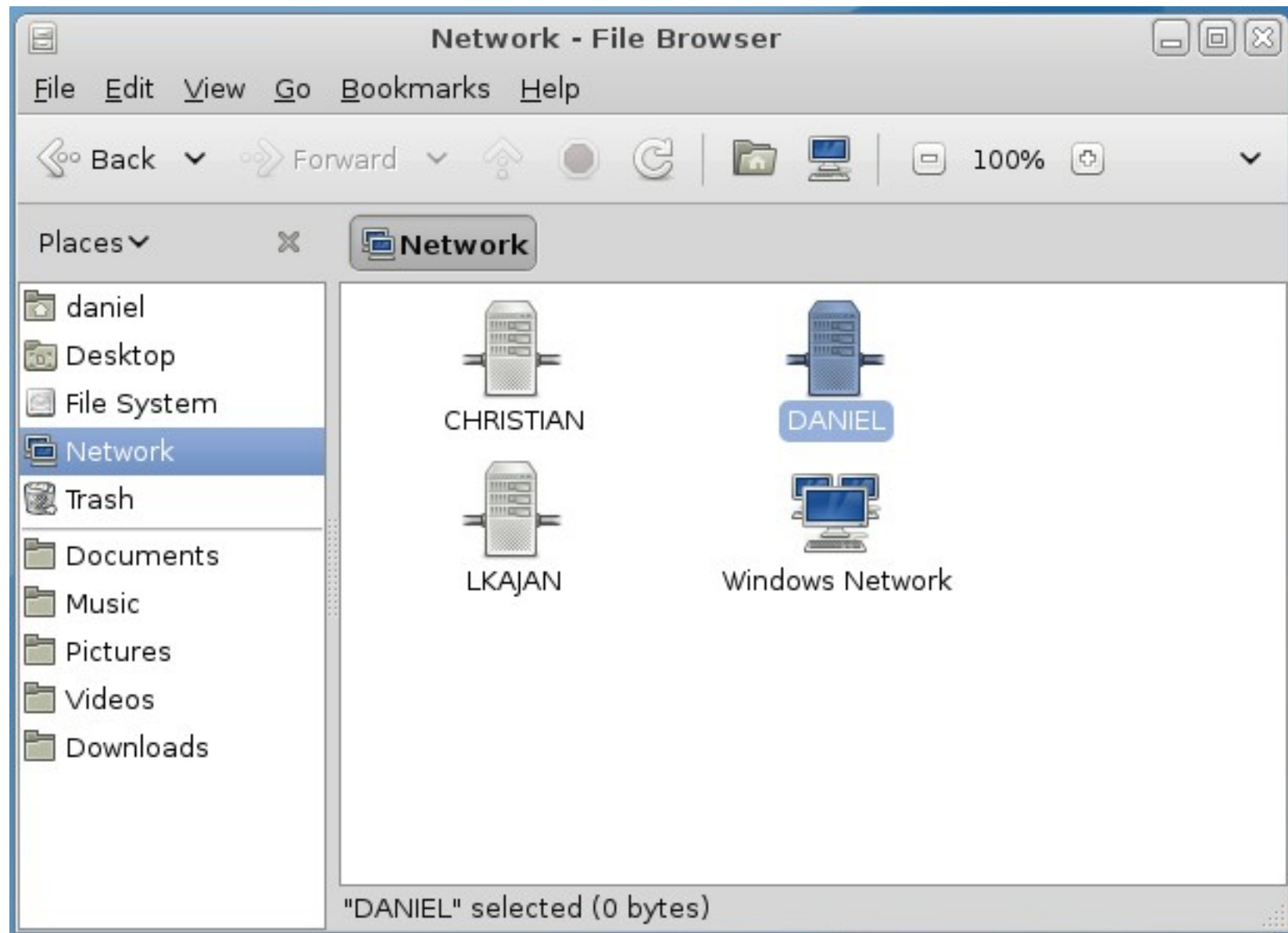
Domain=[TBL] OS=[Unix] Server=[Samba 3.5.6]

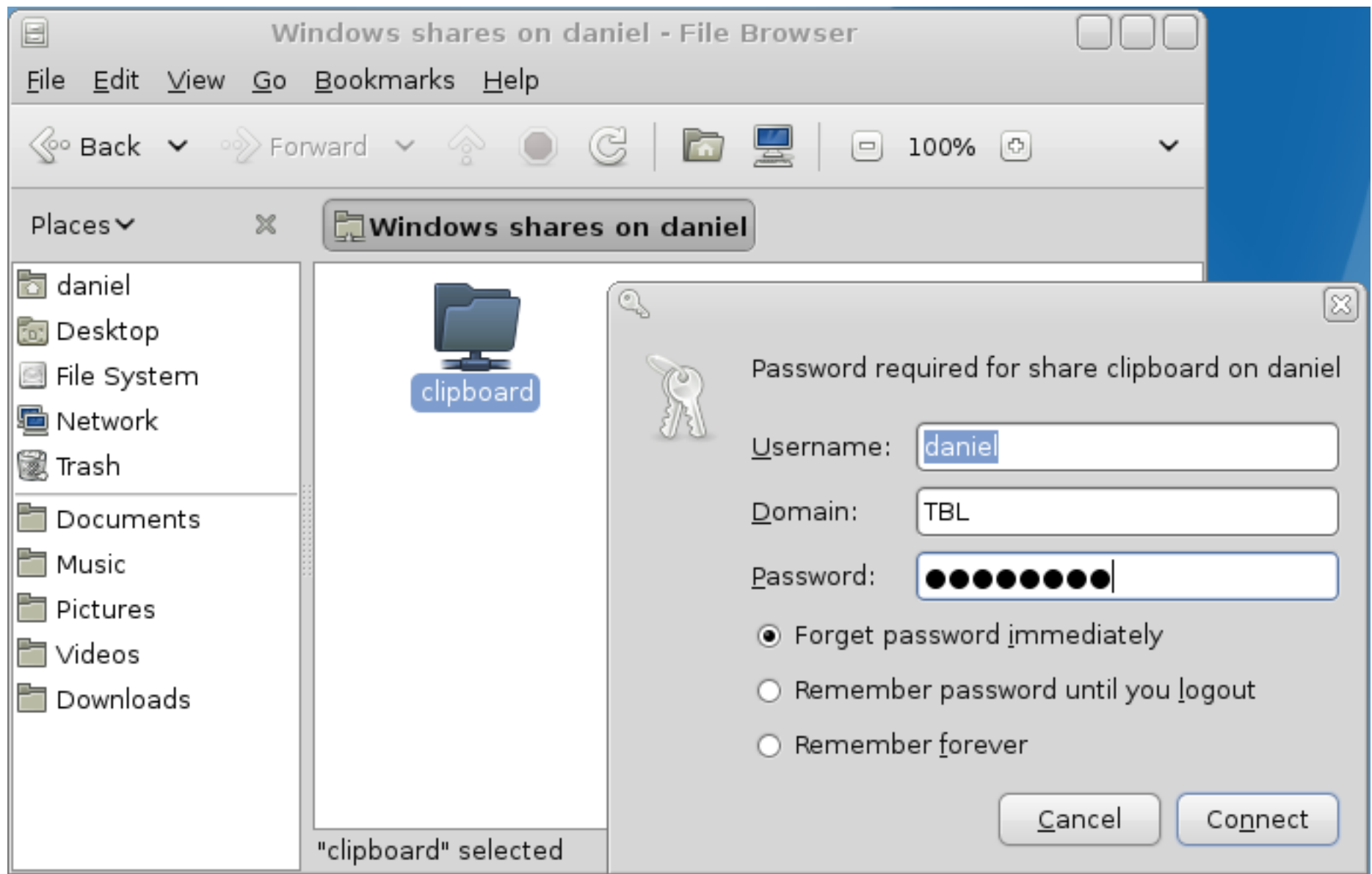
Sharename	Type	Comment
-----	----	-----
print\$	Disk	Printer Drivers
clipboard	Disk	daniel's clipboard
IPC\$	IPC	IPC Service (daniel server)
daniel	Disk	Home Directories

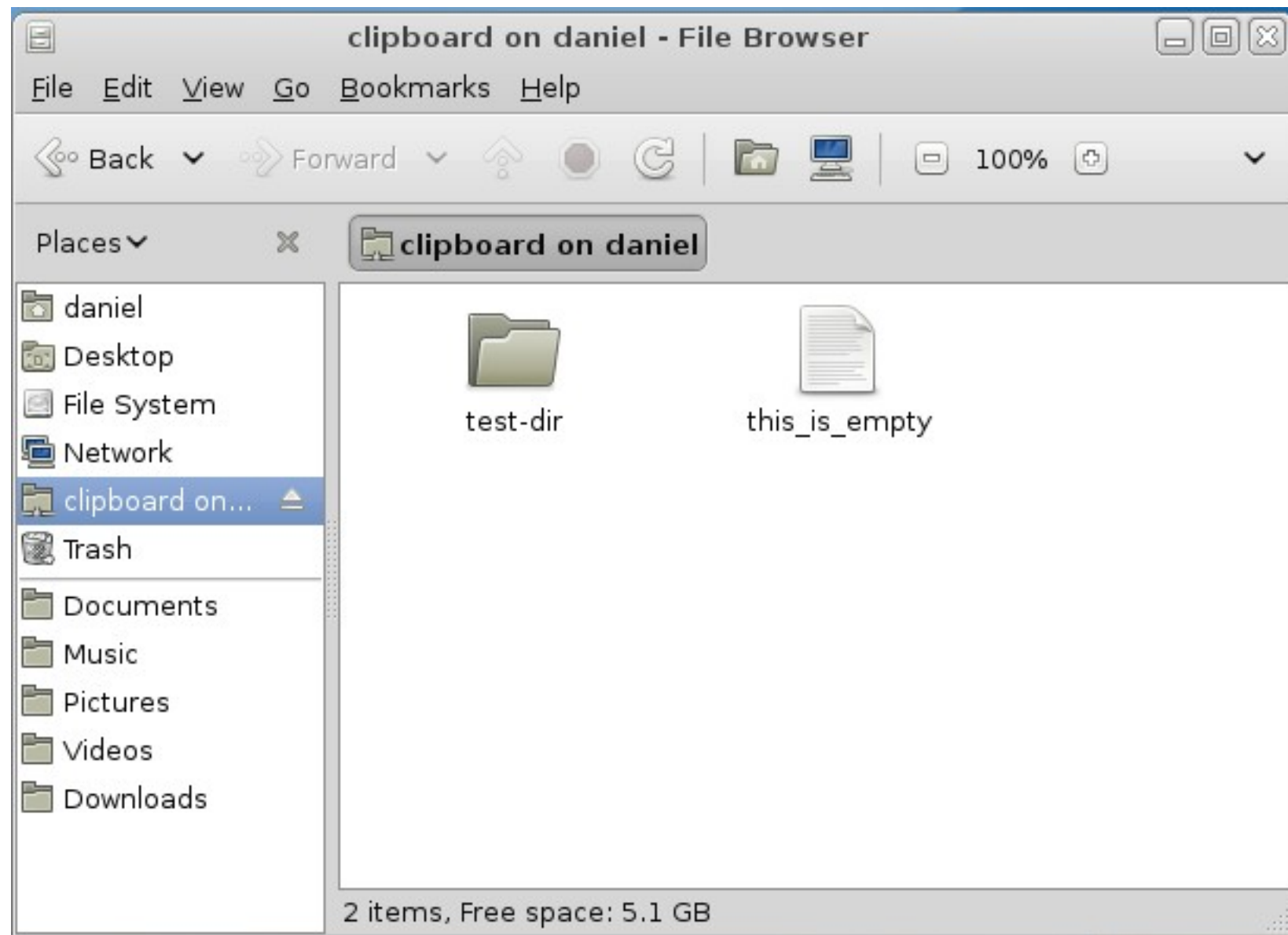
Domain=[TBL] OS=[Unix] Server=[Samba 3.5.6]

Server	Comment
-----	-----
DANIEL	daniel server
LKAJAN	lkajan server

Workgroup	Master
-----	-----
TBL	LKAJAN







SSH File System

Use case SSH Filesystem

- Install package

```
# apt-get install sshfs
```

- Mount / Unmount L0-home on L1

```
L1$ mkdir /home/daniel/L0home
```

```
L1$ sshfs daniel@i12r-tbl.informatik.tu-  
muenchen.de: L0home/ -o port=8574
```

```
L1$ fusermount -u L0home/
```

Sun Grid Engine

Grid Engine

- Install required packages

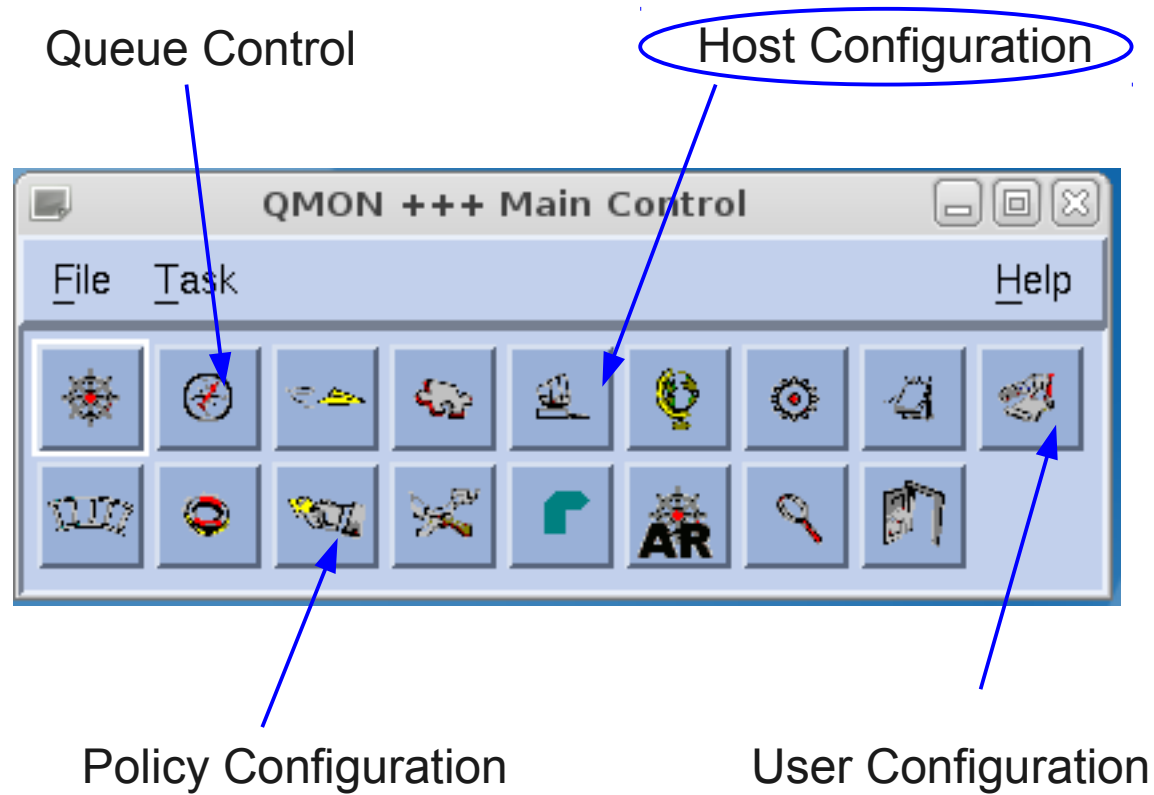
```
# apt-get install qmon
```

```
# apt-get install xfonts-100dpi xfonts-75dpi
```

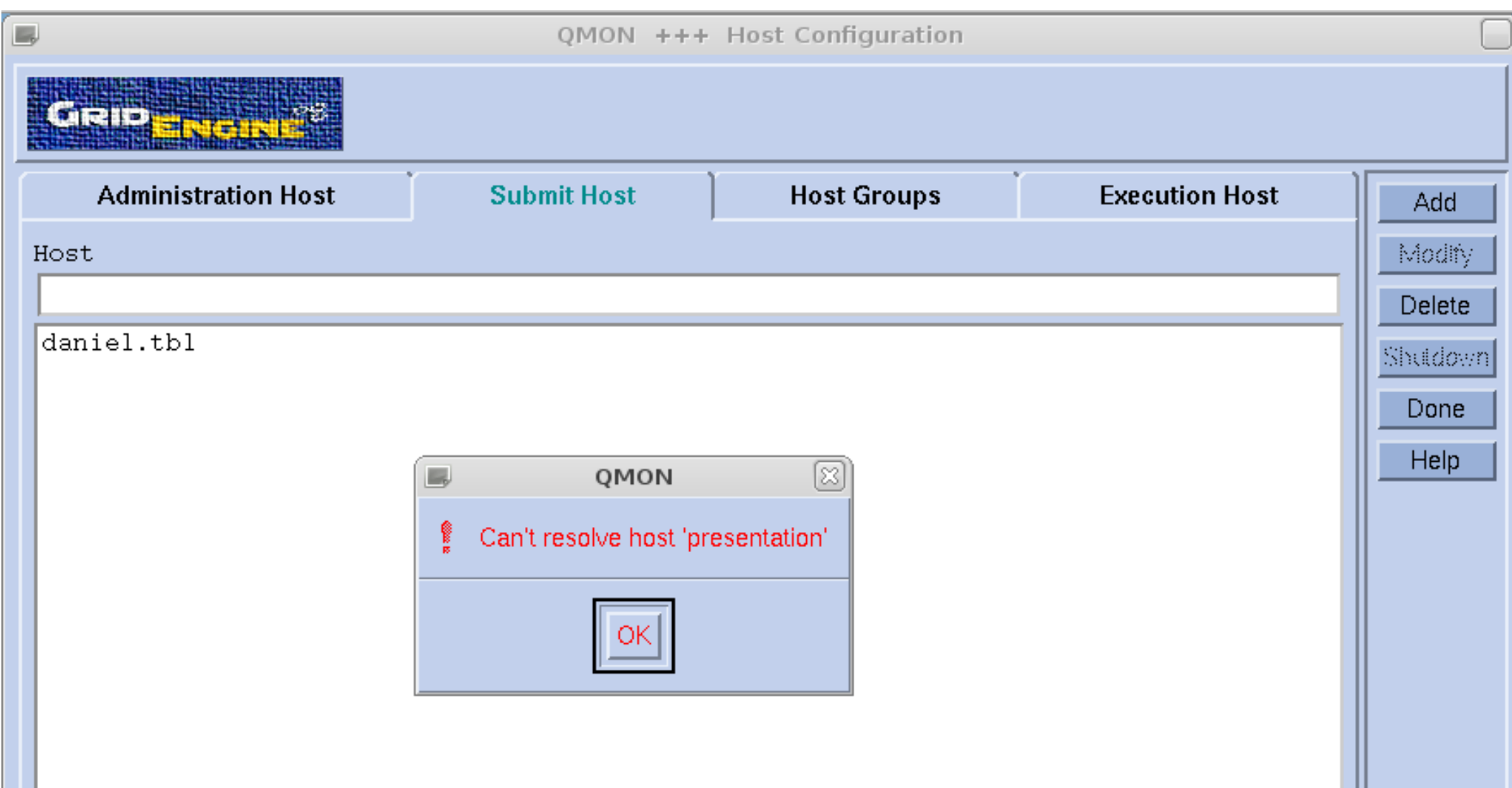
- Open GUI qmon with root privileges



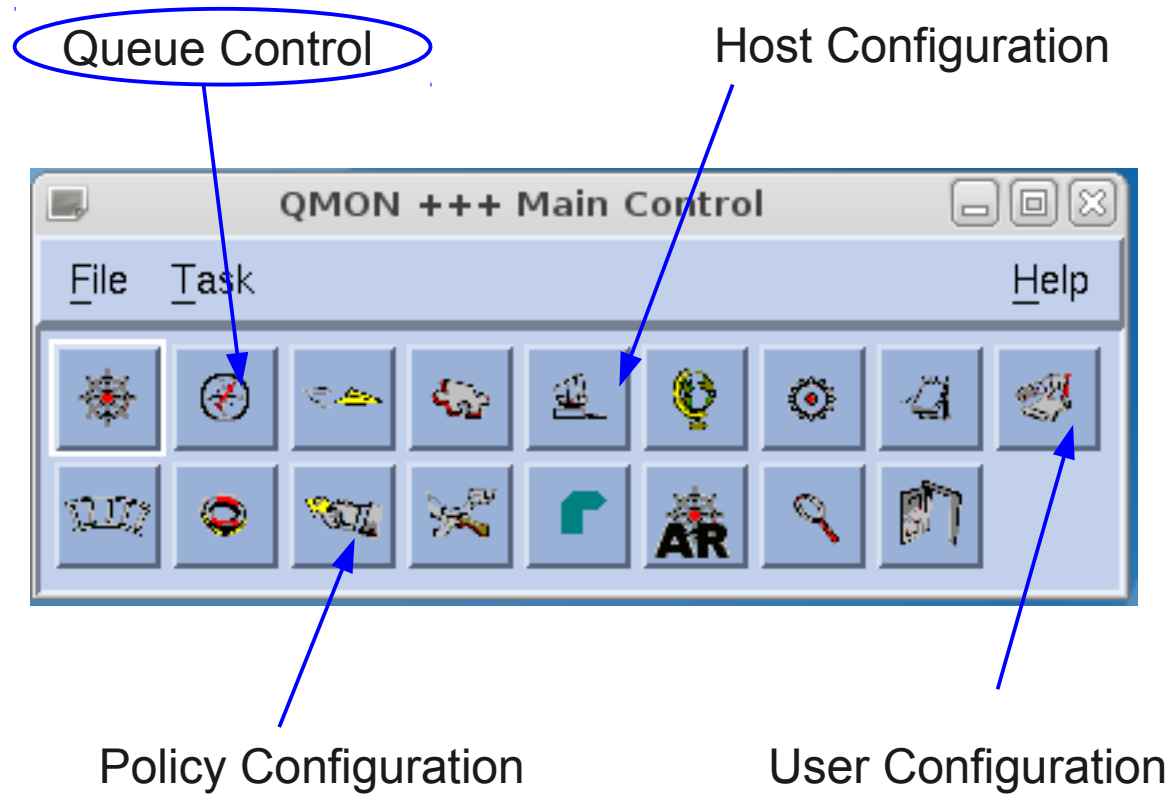
qmon



Add “Submit Host”



qmon




Create new queue

Queue Name

Hostlist

New Host/Hostgroup



Attributes for Host/Hostgroup

Ok
Cancel
Refresh
Help

User Access

Project Access

Owners

Load/Suspend Thresholds

Limits

Complexes

Subordinates

General Configuration

Execution Method

Checkpointing

Parallel Environment

Sequence Nr

Processors

tmp Directory

Shell

Shell Start Mode

Initial State

Rerun Jobs

☐

Calendar

Notify Time

Job's Nice

Slots

Type

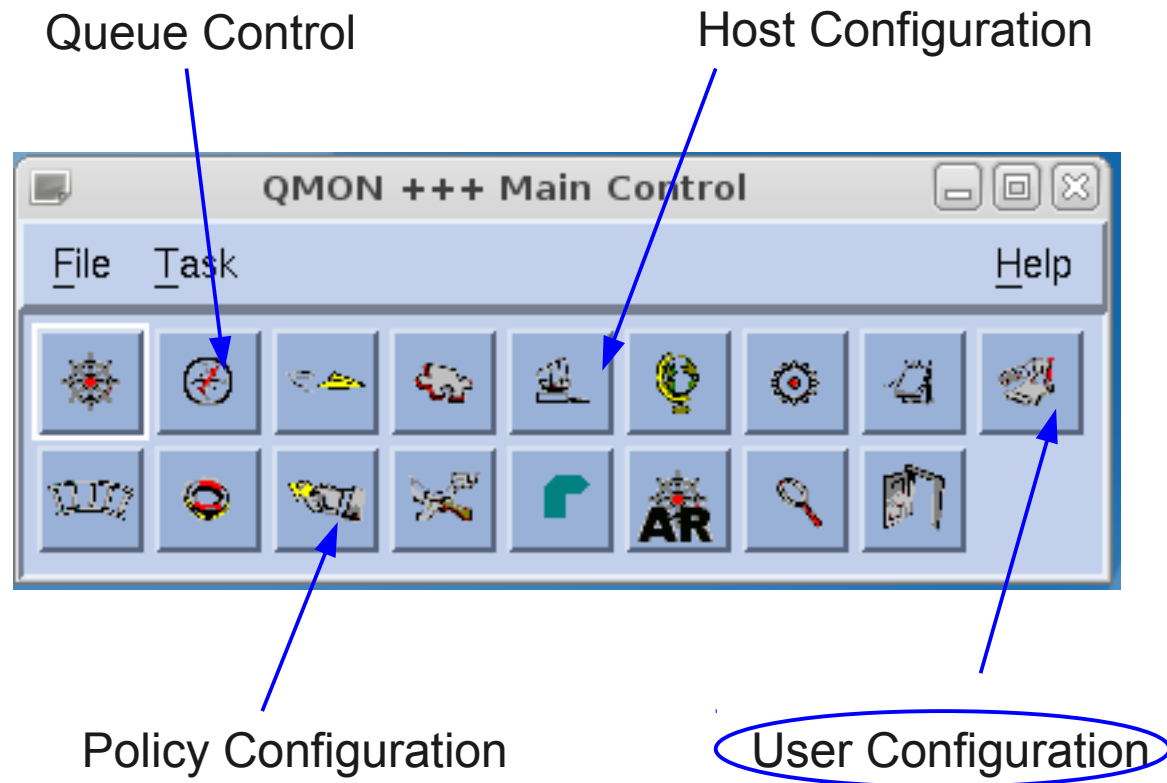
Batch

Interactive

☐ Batch

☐ Interactive

qmon



Add User

QMON +++ User Configuration

Manager

Operator

Userset

User

presentation

User	Default Project	Delete Time
daniel	NONE	0

Add

Modify

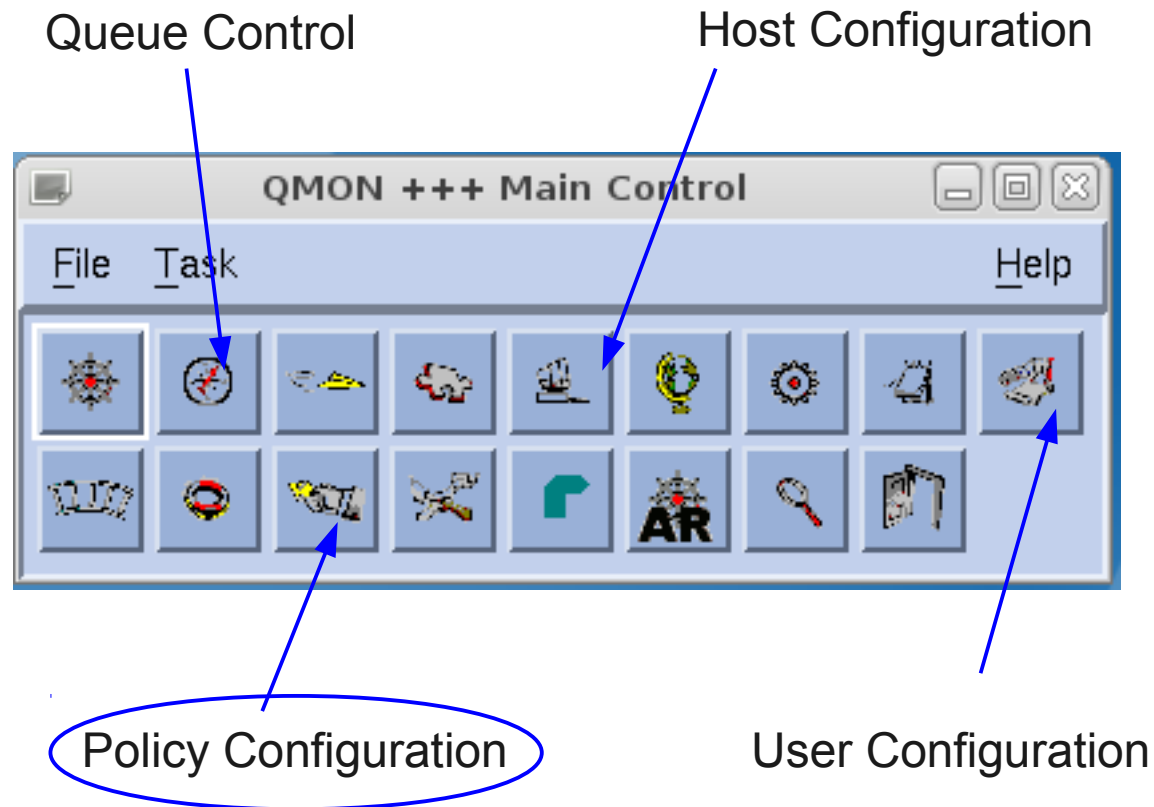
Delete

Tickets

Done

Help

qmon



qmon - policy

@{QMON}

GRIDENGINE

Priority
0

Urgency
0.5

Ticket
0.5

Refresh

Apply

Done

Help

Weight Deadline
3.6e+06

Weight Waiting Time
0.278

Current Active Tickets

Edit Tickets

Share Tree Tickets
10000

Total Share Tree Tickets
10000

Functional Tickets
0

Total Functional Tickets
0

Override Tickets
0

☐ Share Override Tickets

☐ Share Functional Shares

☐ Report Pending Job Tickets

Maximum Functional Jobs
200

Maximum Pending Tasks Per Job
50

Ticket Policy Hierarchy
OFS

Users Allowed To Submit Deadline Jobs

Share Tree Policy

Functional Policy

Override Policy

GRID ENGINE

Root
├─ daniel
├─ **default**
└─

QMON

Name

Share

Ok

Cancel

Refresh

Apply

Done

Help

Add Node

Add Leaf

Modify

Delete

Copy

Cut

Paste

Find

Find Next

Clear Usage

Submitting jobs to the queue

- Write “do_what_I_want.sh”

```
>#!/bin/bash
```

```
>#$ -j yes
```

```
>#$ -o /home/daniel
```

```
>/bin/date
```

- Submit it to queue

```
qsub do_what_I_want.sh
```

- Watch it using “qstat” or “watch qstat”

watch qstat

```

daniel@daniel: ~
File Edit View Search Terminal Help
Every 2.0s: qstat
Thu Jun 28 15:22:58 2012
job-ID  prior   name       user          state submit/start at   queue                slots ja-task-ID
-----
      5 0.75000 test_qsub. daniel        r    06/28/2012 15:22:58 default@daniel.tbl          1
  
```

Where is my output???

```

daniel@daniel: ~
File Edit View Search Terminal Help

daniel@daniel:~$ qsub do_what_I_mean.sh
Your job 6 ("do_what_I_mean.sh") has been submitted
daniel@daniel:~$ ls -l
total 80
drwxr-xr-x 2 daniel mormegil 4096 Jun 28 10:34 Desktop
drwxr-xr-x 2 daniel mormegil 4096 Jun 28 15:20 Documents
-rw-r--r-- 1 daniel fuse      51 Jun 28 15:30 do_what_I_mean.sh
-rw-r--r-- 1 daniel fuse      30 Jun 28 15:30 do_what_I_mean.sh.o6
drwxr-xr-x 2 daniel mormegil 4096 May 13 18:44 Downloads
drwxr-xr-x 2 daniel fuse     4096 Jun 25 22:27 L0home
drwx----- 7 daniel mormegil 4096 Jun 24 14:48 Maildir
-rw----- 1 daniel mormegil  879 May 22 17:54 mbox
drwxr-xr-x 2 daniel mormegil 4096 Apr 18 00:07 Music
drwxr-xr-x 2 daniel mormegil 4096 Apr 18 00:07 Pictures
drwxr-xr-x 2 daniel mormegil 4096 Apr 18 00:07 Public
drwxr-xr-x 2 daniel mormegil 4096 Apr 18 00:07 Templates
-rw-r--r-- 1 daniel fuse      23 Jun 28 11:15 test_qsub.sh
-rw-r--r-- 1 daniel fuse       0 Jun 28 11:16 test_qsub.sh.e1
-rw-r--r-- 1 daniel fuse       0 Jun 28 15:21 test_qsub.sh.e2
-rw-r--r-- 1 daniel fuse       0 Jun 28 15:21 test_qsub.sh.e3
-rw-r--r-- 1 daniel fuse       0 Jun 28 15:21 test_qsub.sh.e4
-rw-r--r-- 1 daniel fuse       0 Jun 28 15:22 test_qsub.sh.e5
-rw-r--r-- 1 daniel fuse      30 Jun 28 11:16 test_qsub.sh.o1
-rw-r--r-- 1 daniel fuse      30 Jun 28 15:21 test_qsub.sh.o2
-rw-r--r-- 1 daniel fuse      30 Jun 28 15:21 test_qsub.sh.o3
-rw-r--r-- 1 daniel fuse      30 Jun 28 15:21 test_qsub.sh.o4
-rw-r--r-- 1 daniel fuse      30 Jun 28 15:22 test_qsub.sh.o5
drwxr-xr-x 2 daniel mormegil 4096 Apr 18 00:07 Videos
drwxr-xr-x 2 daniel fuse     4096 Apr 28 11:06 workspace
daniel@daniel:~$ cat do_what_I_mean.sh.o6
Thu Jun 28 15:30:43 CEST 2012
daniel@daniel:~$

```

References

- man man
 - man exports
 - man exportfs
 - man smb.conf
 - man sshfs
 - man qsub

Thank you for your attention!